



GOOGLE GCAR: CASE ANALYSIS

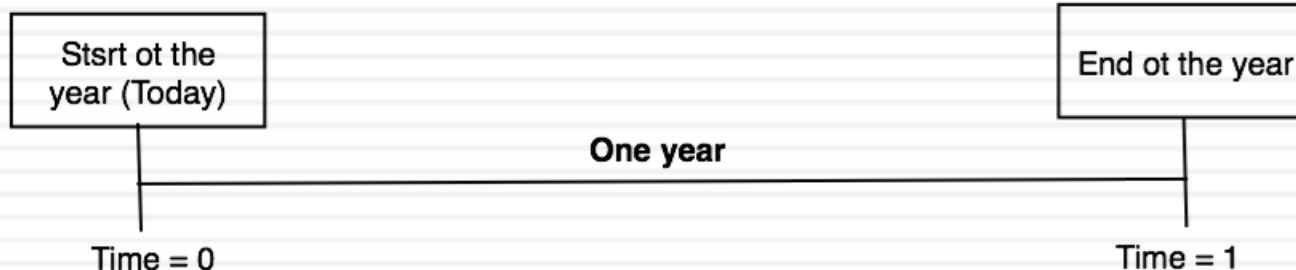
Aswath Damodaran

Discrete and Continuous Time

The Real World

Most of your cash flows occur over the entire year. Revenues and operating expenses are spread over the year, though there may be "seasonal" factors

Some of your cash flows (tax payments, debt payments) occur at discrete intervals (every quarter or month)



The PV World

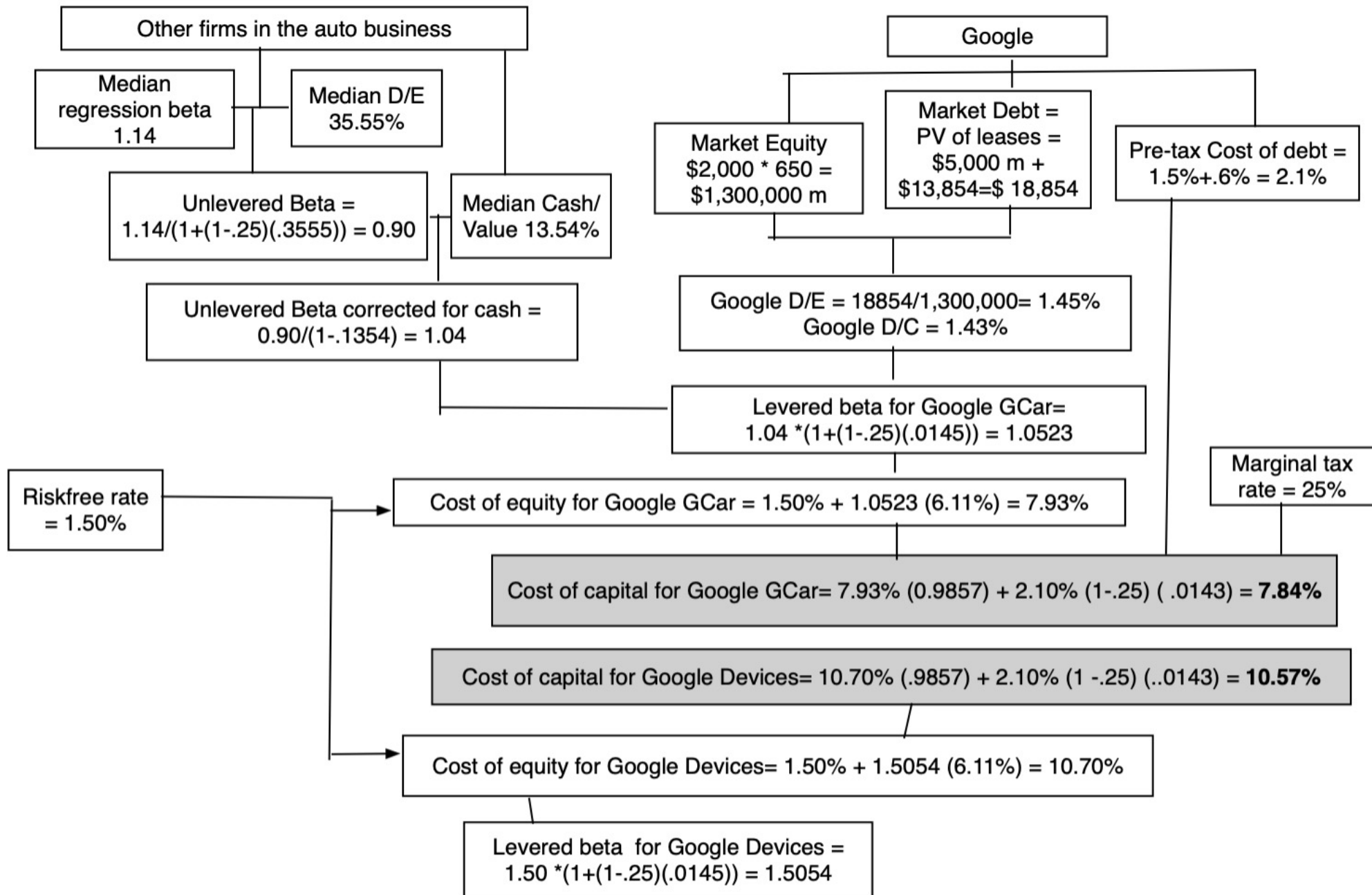
The Discrete Time World: Cash flows are assumed to occur at a point in time.

The Accounting World

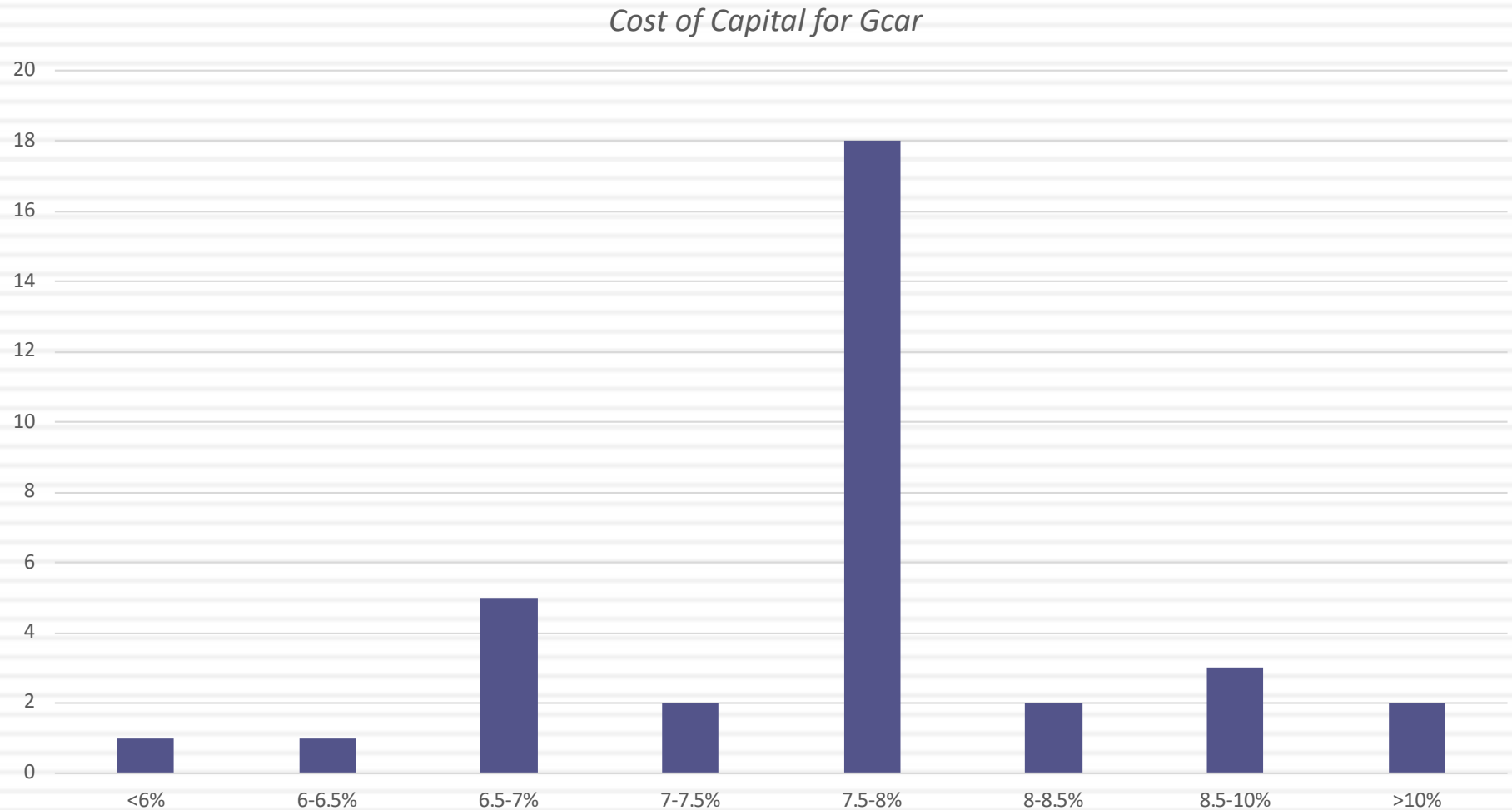
The Accounting World: Revenues, earnings and expenses occur in fiscal years

Summary of Conclusions

- On a stand-alone basis, this project is a value-adding project in the finite life case, albeit only marginal, but with the synergy benefits counted in, it does do better.
- The average return on capital, in the finite life case, is 10.67%, without synergy, and 11.62%, with synergy, both of which are higher than the cost of capital for the Google GCar, which is 7.84%.
- The net present value of the cash flows on Google GCar, using a cost of capital of 7.84%
 - Is \$1,744 million, under the finite life assumption of a of 10 years. Adding the present value of the side benefits to Google Software/Devices, the NPV is +\$2,989 million.
 - Is \$ 16,382 million, under the assumption of an infinite life. Adding the present value of the side benefits of the stories, the NPV is \$18,471 million.
- The IRR is 9.42% with a 10-year life and 10.77% with the infinite life, both of which are greater than the cost of capital.
- All of the numbers in the case are based upon the assumptions that Google is able to capture its forecasted share of the electric car market, and preserve pricing power. Relaxing one or both assumptions causes NPV to drop significantly.
- We would recommend that Google enter the electric car market.



Cost of Capital: Your numbers



Google GCar: Operating Income & Incremental Operating Income

Operating Income										
	1	2	3	4	5	6	7	8	9	10
Revenues	\$ 7,800,000	\$ 16,386,240	\$ 25,818,160	\$ 36,159,193	\$ 47,477,021	\$ 49,869,863	\$ 52,383,304	\$ 55,023,422	\$ 57,796,603	\$ 60,709,552
- Production Costs	\$ 5,200,000	\$ 10,924,160	\$ 17,212,106	\$ 24,106,129	\$ 31,651,347	\$ 33,246,575	\$ 34,922,203	\$ 36,682,282	\$ 38,531,069	\$ 40,473,034
- Marketing Costs (Retail stores)	\$ 624,000	\$ 1,310,899	\$ 2,065,453	\$ 2,892,735	\$ 3,798,162	\$ 3,989,589	\$ 4,190,664	\$ 4,401,874	\$ 4,623,728	\$ 4,856,764
- Marketing Costs (Google stores)	\$ 78,000	\$ 163,862	\$ 258,182	\$ 361,592	\$ 474,770	\$ 498,699	\$ 523,833	\$ 550,234	\$ 577,966	\$ 607,096
- Deprec'n (including capacity)	\$ 2,500,000	\$ 2,500,000	\$ 2,500,000	\$ 2,757,575	\$ 2,757,575	\$ 2,757,575	\$ 2,757,575	\$ 2,757,575	\$ 2,486,861	\$ 2,486,861
- Allocated G&A	\$ 1,550,000	\$ 2,152,900	\$ 2,812,635	\$ 3,533,403	\$ 4,319,680	\$ 4,536,882	\$ 4,765,005	\$ 5,004,598	\$ 5,256,239	\$ 5,520,533
- Advertising Exp.	\$ 1,260,000	\$ 1,323,000	\$ 1,389,150	\$ 1,458,608	\$ 1,531,538	\$ 1,608,115	\$ 1,688,521	\$ 1,772,947	\$ 1,861,594	\$ 1,954,674
Operating Profit	\$ (3,412,000)	\$ (1,988,582)	\$ (419,366)	\$ 1,049,151	\$ 2,943,948	\$ 3,232,428	\$ 3,535,504	\$ 3,853,913	\$ 4,459,146	\$ 4,810,590
Taxes	\$ (853,000)	\$ (497,145)	\$ (104,842)	\$ 262,288	\$ 735,987	\$ 808,107	\$ 883,876	\$ 963,478	\$ 1,114,787	\$ 1,202,648
EBIT(1-t)	\$ (2,559,000)	\$ (1,491,436)	\$ (314,525)	\$ 786,863	\$ 2,207,961	\$ 2,424,321	\$ 2,651,628	\$ 2,890,435	\$ 3,344,360	\$ 3,607,943
Incremental Operating Income										
	1	2	3	4	5	6	7	8	9	10
Revenues	\$ 7,800,000	\$ 16,386,240	\$ 25,818,160	\$ 36,159,193	\$ 47,477,021	\$ 49,869,863	\$ 52,383,304	\$ 55,023,422	\$ 57,796,603	\$ 60,709,552
- Production Costs	\$ 5,200,000	\$ 10,924,160	\$ 17,212,106	\$ 24,106,129	\$ 31,651,347	\$ 33,246,575	\$ 34,922,203	\$ 36,682,282	\$ 38,531,069	\$ 40,473,034
- Marketing Costs (Retail stores)	\$ 624,000	\$ 1,310,899	\$ 2,065,453	\$ 2,892,735	\$ 3,798,162	\$ 3,989,589	\$ 4,190,664	\$ 4,401,874	\$ 4,623,728	\$ 4,856,764
- Marketing Costs (Google stores)	\$ 78,000	\$ 163,862	\$ 258,182	\$ 361,592	\$ 474,770	\$ 498,699	\$ 523,833	\$ 550,234	\$ 577,966	\$ 607,096
- Deprec'n (including capacity)	\$ 2,500,000	\$ 2,500,000	\$ 2,500,000	\$ 2,757,575	\$ 2,757,575	\$ 2,757,575	\$ 2,757,575	\$ 2,757,575	\$ 2,486,861	\$ 2,486,861
- Incremental G&A	\$ 500,000	\$ 1,050,400	\$ 1,655,010	\$ 2,317,897	\$ 3,043,399	\$ 3,196,786	\$ 3,357,904	\$ 3,527,142	\$ 3,704,910	\$ 3,891,638
- Advertising Exp.	\$ 1,260,000	\$ 1,323,000	\$ 1,389,150	\$ 1,458,608	\$ 1,531,538	\$ 1,608,115	\$ 1,688,521	\$ 1,772,947	\$ 1,861,594	\$ 1,954,674
Operating Profit	\$ (2,362,000)	\$ (886,082)	\$ 738,259	\$ 2,264,657	\$ 4,220,230	\$ 4,572,524	\$ 4,942,604	\$ 5,331,369	\$ 6,010,475	\$ 6,439,485
Taxes	\$ (590,500)	\$ (221,520)	\$ 184,565	\$ 566,164	\$ 1,055,057	\$ 1,143,131	\$ 1,235,651	\$ 1,332,842	\$ 1,502,619	\$ 1,609,871
EBIT(1-t)	\$ (1,771,500)	\$ (664,561)	\$ 553,694	\$ 1,698,493	\$ 3,165,172	\$ 3,429,393	\$ 3,706,953	\$ 3,998,526	\$ 4,507,856	\$ 4,829,614

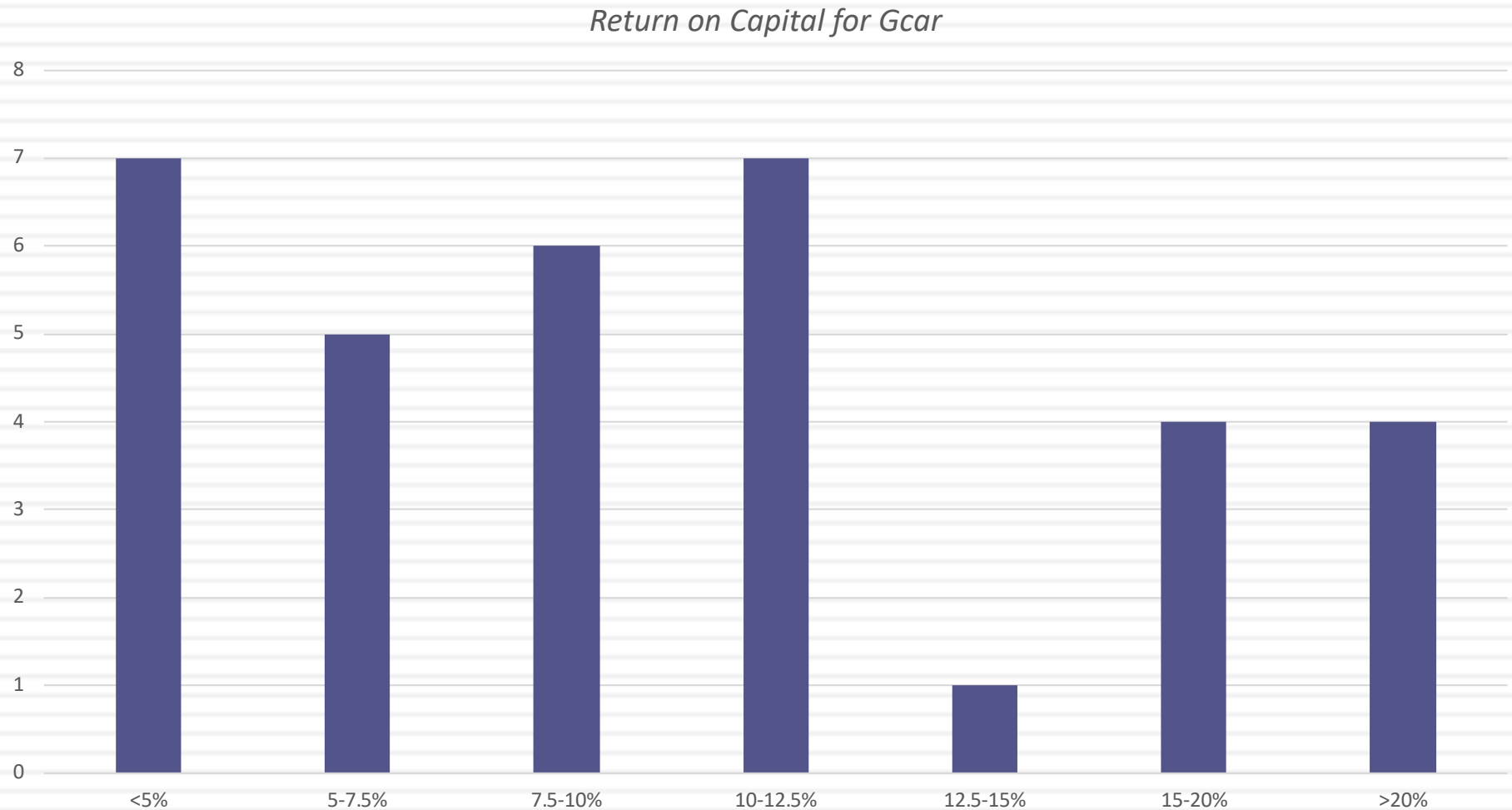
Return on Capital Computation

	1	2	3	4	5	6	7	8	9	10	Average	Aggregate
After-tax Operating Income	-\$2,559,000	-\$1,491,436	-\$314,525	\$786,863	\$2,207,961	\$2,424,321	\$2,651,628	\$2,890,435	\$3,344,360	\$3,607,943		\$13,548,550
After-tax Incremental Operating Income	-\$1,771,500	-\$664,561	\$553,694	\$1,698,493	\$3,165,172	\$3,429,393	\$3,706,953	\$3,998,526	\$4,507,856	\$4,829,614		\$23,453,640
After-tax Operating Income with Synergy	-\$2,359,000	-\$1,289,436	-\$110,505	\$992,923	\$2,416,082	\$2,634,523	\$2,863,932	\$3,104,862	\$3,560,931	\$3,826,680		\$15,640,992
After-tax Incremental Operating Income with Synergy	-\$1,571,500	-\$462,561	\$757,714	\$1,904,553	\$3,373,293	\$3,639,595	\$3,919,257	\$4,212,953	\$4,724,427	\$5,048,351		\$25,546,083
BV of Fixed Assets (start of year)	\$27,000,000	\$24,500,000	\$22,000,000	\$19,500,000	\$17,000,000	\$14,500,000	\$12,000,000	\$9,500,000	\$7,000,000	\$4,500,000		\$157,500,000
BV of Working Capital (start of year)	\$598,000	\$1,256,278	\$1,979,392	\$2,772,205	\$3,639,905	\$3,823,356	\$4,016,053	\$4,218,462	\$4,431,073	\$4,654,399		\$31,389,124
BV of Capacity Expansion	\$0	\$0	\$0	\$5,151,505	\$4,893,930	\$4,636,355	\$4,378,779	\$4,121,204	\$3,863,629	\$3,876,768		\$30,922,169
Invested Capital	\$27,598,000	\$25,756,278	\$23,979,392	\$27,423,710	\$25,533,835	\$22,959,711	\$20,394,833	\$17,839,666	\$15,294,702	\$13,031,167		\$219,811,293
ROIC (no synergy)	-9.27%	-5.79%	-1.31%	2.87%	8.65%	10.56%	13.00%	16.20%	21.87%	27.69%	8.45%	6.16%
Incremental ROIC (no synergy)	-6.42%	-2.58%	2.31%	6.19%	12.40%	14.94%	18.18%	22.41%	29.47%	37.06%	13.40%	10.67%
ROIC (with synergy)	-8.55%	-5.01%	-0.46%	3.62%	9.46%	11.47%	14.04%	17.40%	23.28%	29.37%	9.46%	7.12%
ROIC (no synergy)	-5.69%	-1.80%	3.16%	6.94%	13.21%	15.85%	19.22%	23.62%	30.89%	38.74%	14.41%	11.62%

Some Thoughts on Operating Income...

- There are a number of allocation mechanisms that can be used to compute operating income, and the return on capital is affected by decisions on allocation.
- Your choices on depreciation have profound effects on return on capital. Using a more accelerated depreciation method would raise your return on capital substantially.
- Note that the operating income is computed after marginal taxes (Why?) and does not include the tax savings due to interest expenses (Why?).

Your findings: Return on Capital



Finite Life case assumptions

□ Incremental Effects

- When analyzing the cost of capacity expansion, we consider the cost of the system in year 3 (\$ 5,151 million) but we show the savings in year 8 (\$ 5,414 million). Similarly, for depreciation, we show the depreciation on the existing system of \$ 257.575 million from year 4-8, but show the differential depreciation of -\$13.14 million between the two systems in years 9 & 10.
- Since we are planning on wrapping up the business in 10 years, there is no need for significant capital maintenance expenditures. Even if you do assume capital maintenance, it should scale down as you approach year 10.
- Both working capital investments and capital investments are assumed to occur at the start of the year and are therefore shown at the end of the previous year.

Incremental Cash Flows - Finite Life

<i>Year</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>
Incremental After-tax Operating Income		\$ (1,771,500)	\$ (664,561)	\$ 553,694	\$ 1,698,493	\$ 3,165,172	\$ 3,429,393	\$ 3,706,953	\$ 3,998,526	\$ 4,507,856	\$ 4,829,614
+ Deprec'n		\$ 2,500,000	\$ 2,500,000	\$ 2,500,000	\$ 2,757,575	\$ 2,757,575	\$ 2,757,575	\$ 2,757,575	\$ 2,757,575	\$ 2,486,861	\$ 2,486,861
- Cap Ex	\$ 27,000,000		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
- Opp. Cost of Capacity				\$ 5,151,505		\$ -	\$ -		\$ (5,414,284)	\$ -	\$ -
- Chg in WC	\$ 598,000	\$ 658,278	\$ 723,114	\$ 792,813	\$ 867,700	\$ 183,451	\$ 192,697	\$ 202,409	\$ 212,611	\$ 223,326	\$ (4,654,399)
+ Salvage Value											\$ 2,000,000
After-tax Cashflow	\$ (27,598,000)	\$ 70,222	\$ 1,112,325	\$ (2,890,624)	\$ 3,588,368	\$ 5,739,296	\$ 5,994,271	\$ 6,262,119	\$ 11,957,775	\$ 6,771,391	\$ 13,970,874

The Side Benefits for Google Devices

	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>
Incremental Revenues	\$500,000	\$505,000	\$510,050	\$515,151	\$520,302	\$525,505	\$530,760	\$536,068	\$541,428	\$546,843
After-tax operating income (CF)	\$200,000	\$202,000	\$204,020	\$206,060	\$208,121	\$210,202	\$212,304	\$214,427	\$216,571	\$218,737

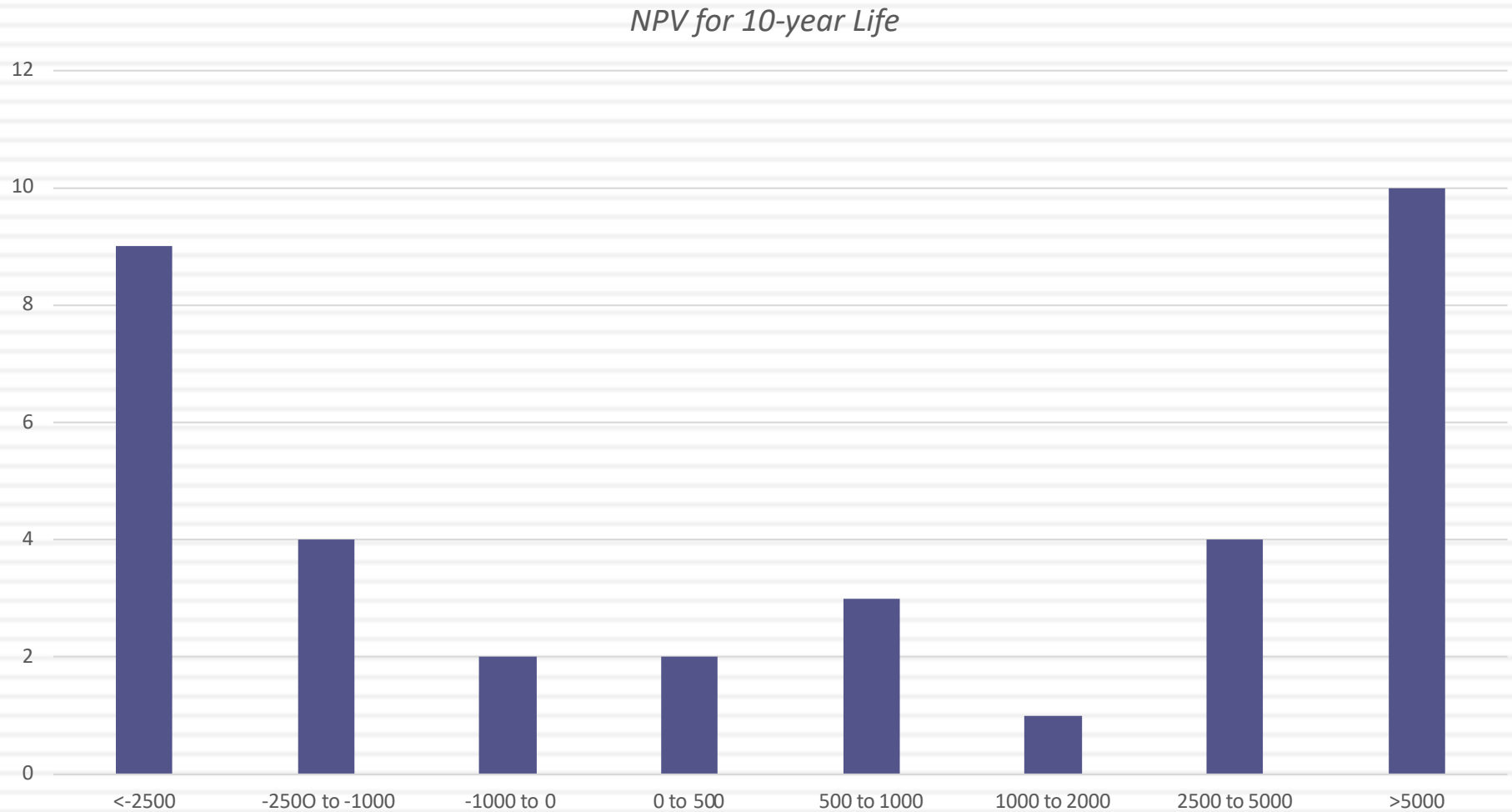
How would you have approached this section

- If you had just been given incremental revenues?
- If you had been given a pre-tax operating margin?
- If you had additional expenses to generate these revenues?
- If you had to wait to get these synergies?

Finite Life NPV

<i>Year</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>
Cash Flow from GCar	\$(27,598,000)	\$70,222	\$1,112,325	\$(2,890,624)	\$3,588,368	\$5,739,296	\$5,994,271	\$6,262,119	\$11,957,775	\$6,771,391	\$13,970,874
PV of Cash Flows from GCar	\$(27,598,000)	\$65,115	\$956,438	\$(2,304,777)	\$2,653,059	\$3,934,785	\$3,810,757	\$3,691,550	\$6,536,574	\$3,432,339	\$6,566,718
Net Present Value of GCar	\$ 1,744,559	<i>Discounted at 7.84% (GCar WACC)</i>									
After-tax operating income (CF)		\$200,000	\$202,000	\$204,020	\$206,060	\$208,121	\$210,202	\$212,304	\$214,427	\$216,571	\$218,737
PV of cash flows		\$180,877	\$165,219	\$150,916	\$137,852	\$125,918	\$115,017	\$105,060	\$95,965	\$87,658	\$80,069
NPV of Device synergy =	\$ 1,244,552	<i>Discounted at 10.57% (Device WACC)</i>									
Overall NPV =	\$ 2,989,111										

NPV with 10-year life



Explanations for Infinite Life Case

- When extending the project life to infinity, I did make some changes to the assumptions about capital maintenance.
 - Made the capital expenditure exceed depreciation by 1% (the inflation rate) all through the 10 years. Essentially, I am assuming that whatever depletion occurs in book value because of depreciation is made up by new capital maintenance expenditures in that year, with the inflation adjustment.
 - Set capital expenditures higher than depreciation, using the inflation adjustment for 10 years ($= 200 \times 1.01^{10}$), in year 11, to allow for the fact that in perpetuity, I would have to keep capacity looking pristine to have growth of 1% a year forever.
- The synergy benefits now continue in perpetuity as well.

Incremental Cash Flows- Infinite Life

<i>Year</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>
Incremental Aftertax Op Inc		\$ (1,771,500)	\$ (590,686)	\$ 679,069	\$ 1,854,619	\$ 3,332,206	\$ 3,587,714	\$ 3,854,713	\$ 4,133,827	\$ 4,628,742	\$ 4,934,066	\$ 5,095,310
+ Deprec'n		\$ 2,500,000	\$ 2,401,500	\$ 2,332,834	\$ 2,549,407	\$ 2,534,864	\$ 2,546,481	\$ 2,560,562	\$ 2,577,175	\$ 2,325,680	\$ 2,347,591	\$ 2,371,067
- Cap Ex	\$ 27,000,000	\$ 1,515,000	\$ 1,714,839	\$ 1,922,817	\$ 2,146,401	\$ 2,393,454	\$ 2,429,719	\$ 2,469,114	\$ 2,511,794	\$ 2,557,932	\$ 2,607,715	\$ 2,619,133
- Opp. Cost of Capacity				\$ 5,151,505		\$ -	\$ -		\$ (5,414,284)			
- Chg in WC	\$ 598,000	\$ 658,278	\$ 723,114	\$ 792,813	\$ 867,700	\$ 183,451	\$ 192,697	\$ 202,409	\$ 212,611	\$ 223,326	\$ 93,553	\$ 94,489
+ Terminal Value											\$ 69,407,763	
After-tax Cashflow	\$ (27,598,000)	\$ (1,444,778)	\$ (627,139)	\$ (4,855,232)	\$ 1,389,925	\$ 3,290,165	\$ 3,511,778	\$ 3,743,752	\$ 9,400,881	\$ 4,173,164	\$ 73,988,152	\$ 4,752,754

The terminal value: Assumptions and Calculation

- After year 10, I assume that the number of subscribers is level, but subscription prices grow at the inflation rate of 1% a year.
- My cash flow in year 11 is much lower than my cash flow in year 10, because I no longer have add on subscribers.
- Terminal Value
 - = CF in year 11/ (Cost of capital –g)
 - = \$ 4,753 m/ (.0784-.01) = \$ 69,408 million

Finite versus Infinite: The Cash Flow Trade off

Year	Finite	Longer Life	Trade Off Cashflow
0	\$(27,598,000)	\$(27,598,000)	\$ -
1	\$ 70,222	\$ (1,444,778)	\$ (1,515,000)
2	\$ 1,112,325	\$ (627,139)	\$ (1,739,464)
3	\$ (2,890,624)	\$ (4,855,232)	\$ (1,964,608)
4	\$ 3,588,368	\$ 1,389,925	\$ (2,198,443)
5	\$ 5,739,296	\$ 3,290,165	\$ (2,449,131)
6	\$ 5,994,271	\$ 3,511,778	\$ (2,482,493)
7	\$ 6,262,119	\$ 3,743,752	\$ (2,518,367)
8	\$ 11,957,775	\$ 9,400,881	\$ (2,556,894)
9	\$ 6,771,391	\$ 4,173,164	\$ (2,598,227)
10	\$ 13,970,874	\$ 73,988,152	\$ 60,017,278

Value Added: NPV of Infinite Life Case

Year	0	1	2	3	4	5	6	7	8	9	10
Cashflows from Gcar	\$ (27,598,000)	\$ (1,444,778)	\$ (627,139)	\$ (4,855,232)	\$ 1,389,925	\$ 3,290,165	\$ 3,511,778	\$ 3,743,752	\$ 9,400,881	\$ 4,173,164	\$ 73,988,152
PV of Cash Flows from GCar	\$ (27,598,000)	\$ (1,339,648)	\$ (539,192)	\$ (3,870,604)	\$ 1,027,424	\$ 2,255,099	\$ 2,231,848	\$ 2,206,146	\$ 5,136,712	\$ 2,114,325	\$ 34,758,257
Net Present Value of GCar	\$ 16,382,366										
Incremental Revenues		\$500,000.00	\$505,000.00	\$510,050.00	\$515,150.50	\$520,302.01	\$525,505.03	\$530,760.08	\$536,067.68	\$541,428.35	\$546,842.64
After-tax operating income		\$200,000.00	\$202,000.00	\$204,020.00	\$206,060.20	\$208,120.80	\$210,202.01	\$212,304.03	\$214,427.07	\$216,571.34	\$218,737.05
Terminal value											\$2,308,000.86
PV of cash flows		\$180,877.44	\$165,219.07	\$150,916.22	\$137,851.56	\$125,917.90	\$115,017.32	\$105,060.39	\$95,965.42	\$87,657.80	\$924,919.96
PV of Devices synergy =	\$ 2,089,403										
Overall Value	\$ 18,471,769										

Consistency in growth and investment assumptions

After year 15

Capital Expenditure Assumption

Project ends

No (or very low) capital maintenance

Let assets run down towards end of life

Infinite life; $g=0\%$

Capital maintenance = Depreciation

Maintain invested capital at base level

Infinite life; $g = \text{inflation}$

Capital maintenance $>$ Depreciation

Capital invested has to grow at inflation rate

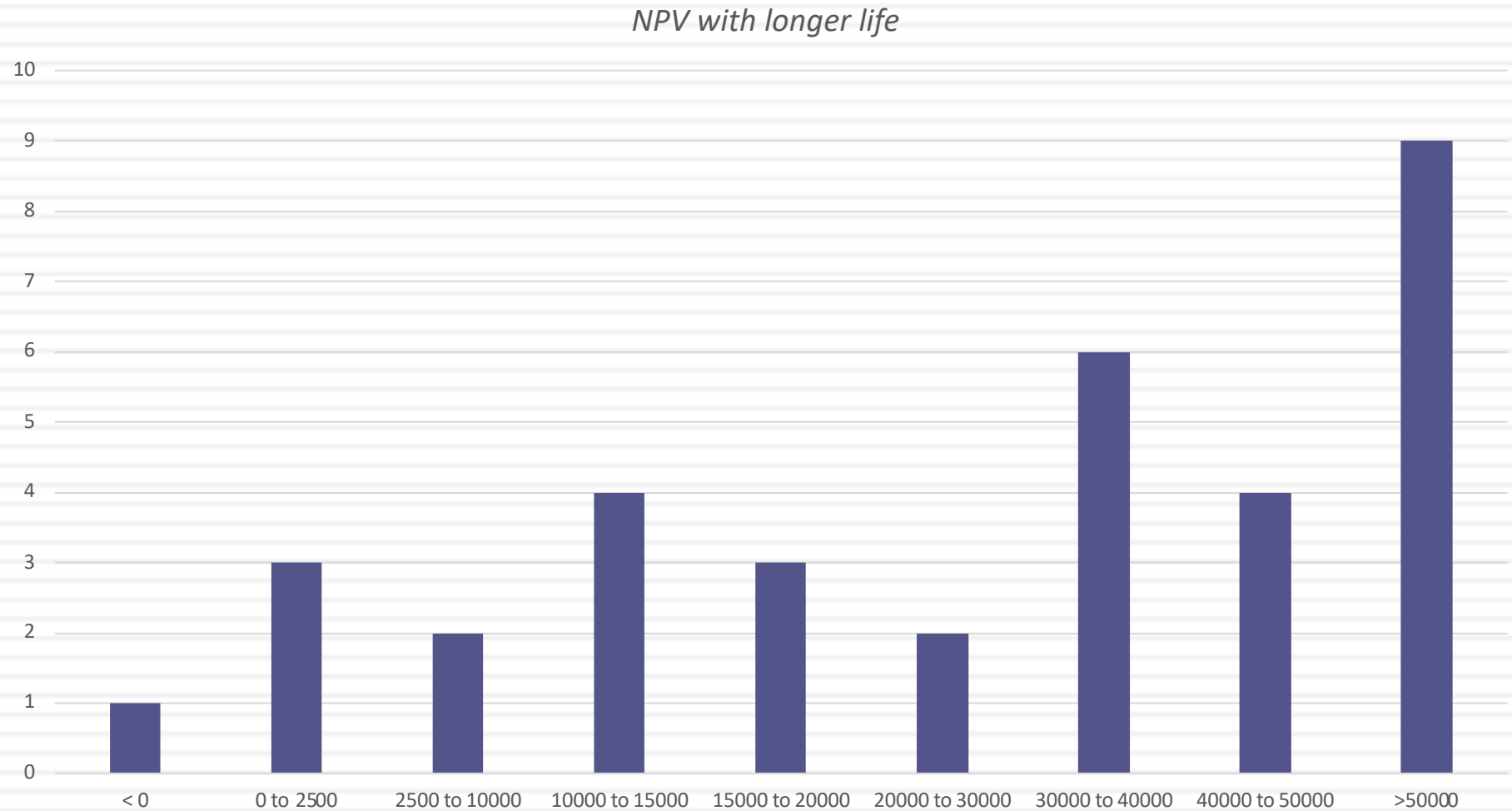
Infinite life; $g > \text{inflation}$

Capital investment to increase capacity

Capital maintenance $>$ Depreciation

Capital invested has to grow to reflect real growth

Your findings: Infinite Life



Why Google may hold back...

- *Search engine business is much too lucrative:* Google's search box is one of the most lucrative products in history, generating huge returns with very little additional effort or capital invested, after its initial success.
- *Not their preferred habitat:* Like any organization, Google is afraid of entering new businesses with very different capital requirements and business models than the ones that they know.
- *Technology fading:* As a technology company, they know how quickly technology can change, and an electric car is more electronics product than automobile.

Final Conclusions

- Of the 38 groups that turned in numbers on this project, 5 decided that it should be rejected.
- 31 groups suggested that the investment be made...
- 2 groups suggested a conditional acceptance...
- If you did accept or reject, is it possible that the six weeks since the case was written might have changed your views.
 - ▣ Why or why not?
 - ▣ If the events of the last few weeks changed your views, what would you do other than express regrets?